Title: Do human listeners build models of environmental noise?

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The main topic of this work is to understand how noisy environments affect speech perception. We hypothesise that human recognition performance should be highest if the spectral and temporal structure of interfering noise is regular, so that a good noise model can be generated, while recognition performance is worse if listeners are presented with highly irregular noise.

The speech stimulus used in this study is a vowel-nasal stimulus which is perceived as /en/if presented in isolation but as /em/ if it is presented with a frequency modulated sinewave (chirp) in the position where the second formant transition would be expected (Meyer and Barry, 1999; Harding and Meyer, 2003).

As a baseline study we present data that shows to what extent a chirp is integrated into the percept as a function of its duration, direction, and position on the speech signal.

In the main experiment the target signal (speech) is presented in a background of periodic noise signals that can match in different localizations with the duration of the formant transition (chirp up, chirp, down, chirp top, chirp bottom). The periodic noise signal is a sinusoid that can appear regularly or irregularly and have a fixed or variable spectrotemporal structure. We expect that the variation in the synchronization of the noise and the speech signal will have an impact on the percept of the speech signal.

Preliminary data shows that at the regular background, the chirp is not integrated by the sinusoid and does not affect the target signal. However, at the irregular condition a duplex percept effect takes place, and the chirp modifies the categorization of the target signal.

We compare the performance of musicians vs. non-musicians, and discuss the theoretical implications of the data with current theories of speech perception.